

**IPM Research Center****German Economic Team in Belarus**

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The Economic Impact of Belarus' Accession to the WTO: A Quantitative Assessment

Summary

In this paper a computable general equilibrium model of the Belarusian economy is employed for the purpose of assessing the impact of its accession to the World Trade Organization (WTO). Since the Belarusian economy strongly depends on gas imports, the model first assesses the effects of changes in the Russian gas import prices, before turning to the effects of changes in trade and tax policies. We estimate that the combined positive effects of Belarus' WTO membership, i.e. tariff reductions, improved market access and domestic tax reform, will more than offset the negative consequence of higher gas prices. We estimate that the value of the Belarusian consumer welfare will rise by about 1.6% after WTO accession, and that GDP will rise by 3.4%. We decomposed all effects and estimated that the largest gains to Belarus will derive from changes in the domestic tax rates including reductions in the export tariff. The latter will spur increases of exports. Our industry-specific data suggest that metallurgy, machine building, oil, coal and other fuels, as well as chemicals and petrochemicals are the sectors that should expand the most as a result of WTO accession.

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1. Introduction

Belarus' trade negotiations are now underway at the WTO. They are causing much debate and some skeptics wonder whether after accession the gains will indeed exceed the losses. For example, Belarusian industrialists and numerous policy analysts are concerned that a reduction of import tariffs and increased competition from abroad will cause their market shares to decline. Therefore, the sources of the gains from WTO accession need to be explored more in more detail. However, quantitative estimates of the consequences of an eventual WTO membership do not yet exist. This paper marks a first step to fill this gap by developing a computable general equilibrium model to evaluate the impact of Belarus' accession to the WTO. We started our simulations by looking at the implications of increased prices for natural gas imports from Russia and analyzed the impact of WTO membership against this background. In particular, we investigated the degree to which WTO membership can help to mitigate or even offset the welfare losses caused by the increased energy costs. We argue that the gains to Belarus from WTO accession derive from the following effects: (1) the fundamental trade liberalization effect known as "gains from trade", which implies that tariff reductions improve domestic resource allocations; (2) the improved access to the markets of non-CIS countries for chemical and petrochemical products, which will grant Belarus improved rights in antidumping investigations, (3) a domestic tax reform, which presumes a mix of domestic tax policies designed to meet certain WTO requirements (subsidy reductions), to strengthen the economy, and to avoid public budget shortfalls (tax harmonization, elimination of exemptions). To understand the sources of these gains, several scenarios were investigated.

The paper is organized as follows: In sections 2 and 3 we describe the model and the most important data. In section 4 we describe and interpret several policy scenarios. Section 5 describes both, the economy-wide and industry-specific effects. Section 6 provides a conclusion.

2. Model

Our analysis is based on a Computable General Equilibrium (CGE) model. The literature contains a large number of different models.¹ The theoretical basis of the present modeling exercise is the applied general equilibrium framework discussed by Shoven and Whalley (1992). Based on this, we used a standard specification, such as used in Harrison et al. (1997), in the static model of Pavel (2001) or in the basic static specification of Jensen et al. (2003). The model is programmed in GAMS/MPSGE as described in Rutherford (1999), an algebraic form of this standard specification can be found in Pavel (2001) or Rutherford and Paltsev (1999).

An overview of the model structure is given in Figure 1. Production takes place under Constant Returns to Scale and all production factors are perfectly mobile. Consumers treat imported and domestically produced goods as imperfect substitutes while producers regard sales on domestic markets or exports as imperfect alternatives. This standard assumption is based on Armington (1996).

Households are endowed with labor and capital and receive transfers. They spend a constant share of their income for investment goods. Final consumption is modeled by a Cobb Douglas function of a representative household.

The government receives revenues from taxes and tariffs as well as income from its share in the capital stock of the Belarusian economy. The government uses this income to provide direct and indirect subsidies (mainly to agriculture, housing, utilities, health services etc.), to finance public investments, and for the provision of

¹ See e.g. de Melo (1988), Francois and Shiells (1994) or Devarajan and Robinson (2002) for general surveys.

public goods. In all scenarios, the indirect tax rate adjusts endogenously so that the real value of public goods remains constant. Total investments equal the sum of depreciation, public and private savings and the current account balance.

Since all supply and demand functions in our model are homogenous of degree zero in prices, one price (the so-called numeraire) has to be fixed exogenously while all other endogenous price variables define the change relative to this numeraire. The choice of the numeraire as such has no impact on the results. In our model, we chose the price index for investment goods.

3. Data

The basis for our modeling exercise is a Social Accounting Matrix (see e.g. Pyatt and Round 1985) that we put together on the basis of Belarus' National Accounts and the Input-Output (IO) tables for 2001 at basic prices.

Imports and exports in the IO tables have been disaggregated into trade flows with CIS countries (for which there exist free trade agreements) and all other countries (for essentially all of them the Most Favored Nation (MFN) tariffs apply).

IO tables include 34 activities/commodities. They have been aggregated into 23 sectors as explained in Table B1 in the Appendix.

Belarus' IO table contains information about revenues and expenditures from direct 'taxes and subsidies on production', as well as revenues and expenditures from indirect 'taxes and subsidies on commodities'.

Direct taxes on production are levied on the use of labor and capital assets (e.g. taxes on the acquisition of transport facilities), on the use of natural resources, or on land, buildings and construction. Furthermore, there are several state duties as well as other dues, e.g. for the permission to carry out specific activities, or to funds earmarked for special purposes. Direct subsidies are granted for production of outputs or for use of factors in production. As a result of the wide range of different taxes with again different tax bases, the rates of direct taxes and subsidies vary considerably across all sectors. As the IO table reports the total revenues and expenditures from all such taxes, we use this information to calculate the net rate of all direct taxes and subsidies (Table 1).²

In addition to the already mentioned direct taxes, the exports of four sectors (oil industry, chemicals and petrochemicals, food processing (alcoholic beverages) and agriculture (fish, crustaceans, mollusks)) are also taxed. We consider these taxes at the official rates, adjusted to our aggregation scheme (Table 1).

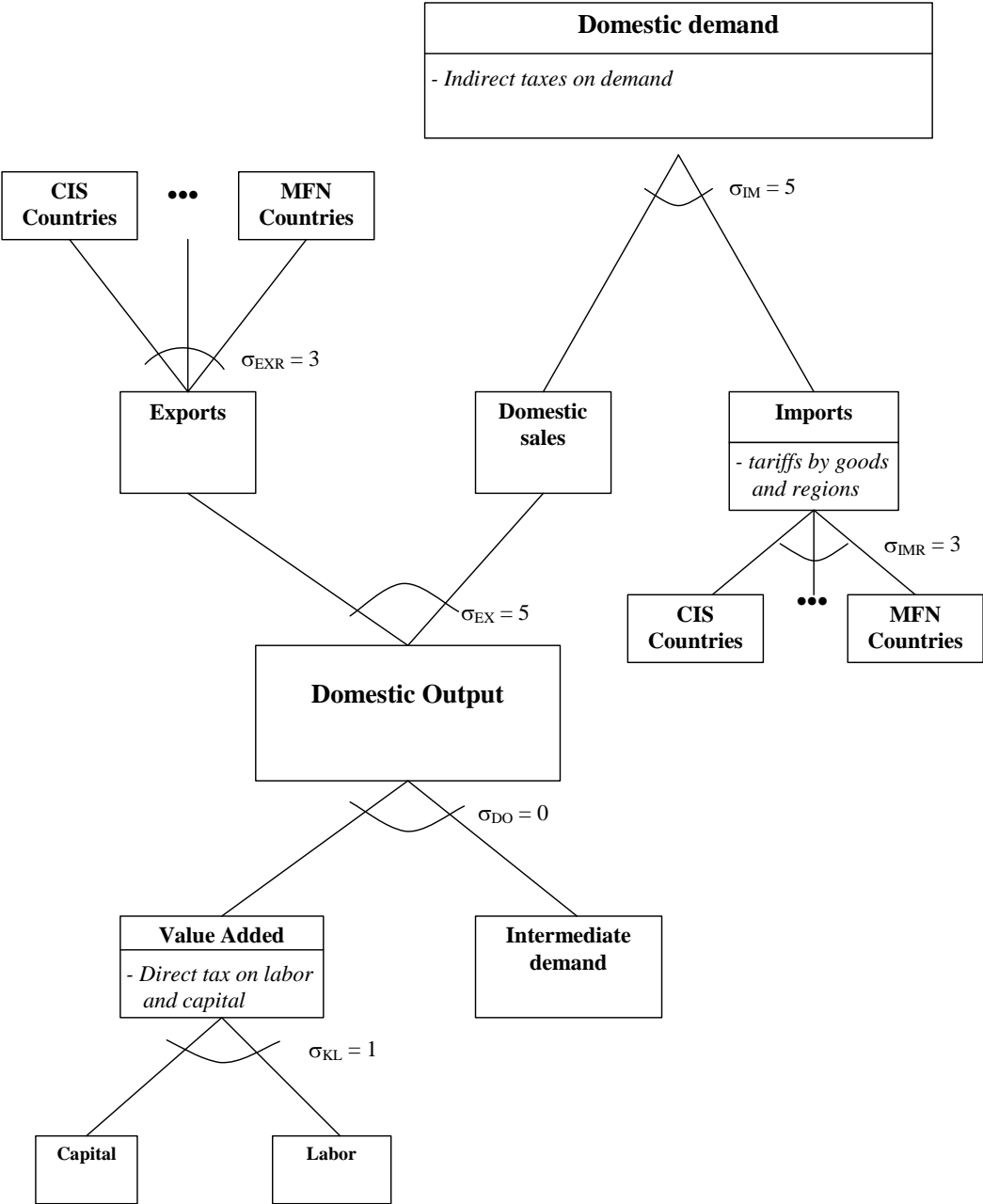
Indirect taxes on commodities include the value added tax (VAT), excises, the sales tax, taxes on the use of roads and vehicles, contributions to funds for special purposes related to the maintenance and repair of housing property, contributions to the fund for supporting agricultural production, as well as customs duties. Indirect subsidies are granted for the consumption of some commodities such as agricultural goods or housing and utilities. To arrive at the respective tax rates, we proceed as follows: First, we explicitly set the VAT at a level of 50% of the rates defined in the present Belarusian tax legislation (with specific consideration to various tax privileges). Hence, we assume that the effective VAT rates equal half of their nominal levels. Next, we set the tariffs on imports from non-CIS countries at the levels that Belarus applies to imports from MFN countries.³ Now, we subtract the implied revenue from VAT and import tariffs from the net revenues from all indirect taxes and subsidies as given in the IO table. Finally, we use the resulting net revenue from all other indirect taxes

² This net tax/subsidy rate is assumed to be a direct tax/subsidy rate on the use of labor and capital in production. A negative rate — e.g. for agriculture — indicates a net subsidy.

³ Imports from non-MFN countries are insignificantly small and are thus not considered in our analysis.

and subsidies to calculate the net tax/subsidy rates for all other indirect taxes and subsidies (with the aggregate demand of the IO tables as the relevant tax base).

Figure 1. Structure of the Model



σ denotes elasticity of transformation.

Parameter Parameters: *

- Elasticity of substitution between labor and capital 1
 - Elasticity of substitution between Value Added and Intermediates 0
 - Elasticity of substitution between imports and domestic goods 5
 - Elasticity of transformation between domestic output and exports 5
 - Elasticity of substitution between imports of different origin 3
 - Elasticity of transformation between exports to different destinations 3
- Source: own graph.

* The elasticity parameters were taken from Jensen et al. (2003).

Table 1. Direct and Indirect Taxes in Belarus (ad-valorem equivalents)

	Indirect Taxes (%):			Direct Taxes (%):	
	VAT	MFN tariffs	Other indirect taxes	Taxes on production	Taxes on exports (MFN)
Electricity and heating	9	2	10	13	
Gas industry	9				
Oil, coal and other fuels industry	9	1		27	26
Chemicals and petrochemicals industry	9	7	4	10	5
Metallurgy and machine building	8	10	3	7	
Timber, woodworking, pulp and paper industry	9	15	8	6	
Glass, porcelain and faience industry	9	14	7	11	
Light industry	9	13	-1	6	
Food processing	7	6	4	9	4
Other branches of industry	9	19	3	4	
Construction	5		6	4	
Agriculture	5	12	-1	-12	1
Forest industry	9		-3	1	
Transport	6		3	5	
Communications	5		15	2	
Trade, catering and interagency	9		9	2	
Geology and hydrometeorology	9		1	3	
Calculative and computing services	9			4	
Housing and utilities, and other domestic services			-9	4	
Health services, culture and welfare services	9		-8		
Education, science and culture				1	
Operations with real estate and financial services	3		1	2	
Governance and defense					
Public organizations				1	

Source: own calculations.

Finally, the net tax revenues/subsidy expenditures on production in the IO data suggest only little direct support for agriculture. However, according to Belarusian budget information, the expenditures for direct and indirect subsidies to agriculture are almost twice as high as the taxation revenues derived from IO table,⁴ and around 80% of the total support is given through direct subsidies. Hence, we adjusted our database to include this information while keeping the net balance of direct and indirect support at the level reported in the IO table. The resulting tax rates are given in Table 1.

4. Policy simulations

We started our simulations by looking at the implications of increased prices for natural gas imports from Russia in 2004. The first scenario investigates the effects of increased gas prices as the background against which we analyzed the impact of the WTO membership in the following scenarios. In particular, we investigated the degree to which WTO membership can help to mitigate or even offset the welfare losses caused by the increased energy costs. In our simulations, WTO membership affects the Belarusian economy through three different channels: reduced import tariffs, improved access for Belarusian exports to foreign markets, and changes in the domestic taxation regime. To assess the specific impact of each of those effects, we model them separately in the next four scenarios and then finally, combine all of them in our final scenario.

Hence, our scenarios are defined as follows:

Scenario 1: Increased price for gas imports by 25%:

Scenario 2: Increased price for gas imports plus full WTO membership, simulated by three mechanisms (as defined below): tariff reduction, improved market access, adjustments to the domestic tax system.

⁴ For example, state support for agriculture from state and local budgets in 2002 amounted to BYR 691.5 bn while tax revenues for the same period were only BYR 360 bn.

To study the individual effects of each mechanism, we also simulate each WTO mechanism separately:

Scenario 3: A 60% reduction of MFN tariffs on imports.⁵

Scenario 4: Improved market access for exports of chemical products to non-CIS countries by raising the respective (exogenous) price that exporters face by 10%.

Scenario 5: Domestic tax reform:

Scenario 5a: A mix of domestic tax policies designed to meet certain WTO requirements (subsidy reductions), to strengthen the economy, and to avoid public budget shortfalls (tax harmonization, elimination of exemptions):

The direct taxes on activities were set to 5% for all sectors;

For agriculture, a 5% direct subsidy was maintained;

A VAT at equal tax rates without any privileges was set as the only indirect tax on commodities;⁶

All export taxes were reduced by 50%.

Scenario 5b: Domestic tax reform excluding the export tax reduction.

5. Results

In this study we used a comparative static modeling approach to quantify and compare the effects of changes in the price for Russian gas imports, as well as changes in trade and tax policies. Our results describe the difference between the initial (current) equilibrium prior to price and policy changes – the benchmark – and a new equilibrium, in which the economy has fully adjusted to the new policies and price levels. Typically, such an adjustment takes around 10 to 15 years.

Economy-wide effects:

Table A1 reports the economy-wide results of our evaluations. As expected, the higher prices for gas imports from Russia (Scenario 1) have negative consequences for the Belarusian economy. We find static welfare losses of around 1.5% of Belarus' consumption and a GDP decrease of 1.2%. Accordingly, real factor returns drop by 1.3% both in the case of wages for capital and labor, while producer and consumer prices go up by 1.4% and 0.2% respectively.

Against this background, the next policy assessment (Scenario 2) demonstrates to what extent WTO membership can mitigate welfare losses from increased energy costs. As our results show, the combined positive effects of Belarus' WTO membership, i.e. tariff reductions, improved market access and domestic tax reform, will more than offset the negative consequence of higher gas prices. In particular, the welfare gains will amount to 1.6% of Belarus' consumption and the GDP will rise by 3.4%. Furthermore, the return on capital will increase by around 3%, while the wage rate will drop by around 0.6%, caused by reductions in the export revenues of labor-intensive industries (see the discussions concerning industry-specific results below for more details) and hence a reduction of the demand for labor relative to capital. Consumer prices will rise by about 3.4% as a result of the higher gas prices and of the domestic tax reform, while the producer price index will drop, since reduced import

⁵ A general reduction of all tariffs by 60% was chosen because no specific information about the intended commitments was available from Belarusian officials so far.

⁶ The VAT rate adjusts in our model so as to ensure a constant provision of public goods in real terms. Hence, all our policy scenarios are budget neutral so that the welfare of private households will not be affected by changes in the provisions of public goods.

tariffs will increase competition from abroad and reduce the prices on inputs. Finally, exports and imports will rise by around 12%.

While Scenario 2 highlights the combined result of WTO accession, the impacts of the three different effects cannot be seen directly. This, however, will be of particular interest to Belarusian policy makers, e.g. when they have to choose priorities during the negotiations. Consequently, Scenarios 3 to 5 decompose the overall results of WTO accession into the specific impacts caused by tariff reduction, improved market access and domestic tax reform.

If only the import tariffs were reduced (Scenario 3), the relative prices for imports would fall and reduce domestic producer price levels by 1.5%. At the same time, however, the government would have to make up for the revenue losses caused by the reduced tariffs (their share in the public budget falling from 10% to 5%) by raising the indirect tax rates (the share of indirect tax revenue would increase from 50% to 55%), which would tend to counteract the reduction in consumer prices. As a consequence, the consumer price index would remain almost constant.

The higher demand for imports caused by the lower tariffs would also stimulate exports since the additional imports would need to be purchased with foreign currency. As a result, both imports and exports would rise by around 2.5%, the GDP would expand by 0.3%, and the wage rate would increase by 0.8%. On the other hand, the return on capital would reduce slightly by 0.4%. As a result of the almost unchanged consumer prices and the small increase in real wages, consumer welfare would increase by 0.4% of consumption only (as compared to 3.4% in Scenario 2).

In Scenario 4 we studied the impact of improved market access for exports of chemical products to non-CIS countries. Since chemical products account for around 15% of total exports, improved market access would lead to higher total exports (increase by 1.3%) and – consequently – imports (by 1.2%). Hence, the GDP would rise by 0.8%. Since the chemical industry is rather capital intensive, higher exports of chemical products would make capital relatively scarce and in turn, would increase the return on capital by around 1.2%.

Scenarios 5a and 5b present the results of the domestic tax reforms with and without export tax reduction, respectively. From an economy-wide perspective, the adjustment of domestic taxation and the reduction of export taxes on (mainly) oil products and chemicals and petrochemical goods by 50% (Scenario 5a) would expand the GDP by 3.3% due to an 8% increase in exports, and raise the consumer welfare (Equivalent Variation) by 1.7%. This would mainly be caused by a strong expansion of exports of the oil industry (where export taxes are now by far the highest), which would also raise the demand for capital relative to labor, since this industry is rather capital intensive. Consequently, the return on capital would increase by 3.6%, which translates directly into higher consumer incomes and thus welfare levels. Finally, the increased exports would also cause the real exchange rate to drop by 2.5%.

Excluding the export taxes from the domestic tax adjustments (Scenario 5b) would have strong, economy-wide implications. Now, exports and imports would only grow by 3%. While this is still sufficient to generate a 2.2% increase of GDP, the effect on consumer welfare is almost zero, as relative factor prices remain almost constant.

Industry-specific results:

The impacts of the different policies on each sector depend on the sectors' production structures and initial protection levels. Obviously, under Scenario 1 increased prices for gas imports are harmful to industries that have a high share of gas in their intermediate consumption. This is especially true for electricity and heating, chemicals

and petrochemicals, glass, porcelain and faience, industries in which we estimate the highest output level reductions to occur (Table A2).

A reduction of import tariffs (under Scenario 3) primarily hurts protected industries. In particular, it appears that sectors with initial ad-valorem tariff equivalents of more than 10% (timber, woodworking, pulp and paper, glass, porcelain and faience, light industry, and other branches of industry) would experience the largest declines in output (Table A2). However, since higher imports also imply higher exports due to the decline of the real exchange rate, some sectors could also increase their outputs. This is particularly true for metallurgy and machine building, where the intermediate demand accounts for a rather large share of total costs (so that the industry benefits from lower domestic producer prices) and where exports, a large share of its output, benefit from only modest levels of protection.

As was expected, the developments of exports and imports will show similar patterns. Exports would increase primarily for metallurgy and machine building (Table A3). On the other hand, we find the largest increase of imports for glass, porcelain and faience, light industry, timber, woodworking, pulp and paper, agriculture and other branches of industry: industries producing goods for which consumers will substitute with cheaper imports (Table A4).

Evidently, improving the market access for chemical goods (Scenario 4) would lead to increases in their outputs and exports (by 17% and 28% respectively Tables A3, A4).

Setting the direct tax rates for all sectors at a uniform level of 5% within the domestic tax reform (Scenarios 5a and 5b) would reduce the outputs of those sectors that initially benefited especially strongly from subsidies. This is the case for agriculture and – to a lesser extent – light industry under both scenarios (Table A2). In turn, the drop in agricultural output would lead to a sufficient increase in imports by around 20%. On the other hand, all sectors that had previously been directly taxed at rates above 5% would expand their outputs.⁷

Not surprisingly, the industry-specific results for the oil, coal and other fuels industry differ significantly between Scenarios 5a and 5b (see Tables A2, A3 and A4). If export taxes were reduced by 50% (Scenario 5a) oil, coal and other fuels and – to a lesser extent – chemicals and petrochemicals would benefit directly. They would strongly expand outputs (by 23% and 10%), mainly due to higher exports (by 53% and 11%). On the other hand, if the export taxes were not reduced outputs and exports would increase much less (by 5% and 6% respectively for oil, coal and other fuels, and by 7% and 8% respectively for chemicals and petrochemicals). As a consequence of the strong expansion of exports, more foreign currency would flow into Belarus and cause the real exchange rate to decrease by about 2.5%. This generally reduces export revenues, which especially hurts timber, woodworking, pulp and paper, and light industry, all of which export large shares of their outputs but would not benefit from reduced export taxes (since their exports are not taxed at all right now). As a result, we find significantly stronger output and export declines for these industries if export taxes were reduced.

The last observation also explains the different results for the factor prices in Scenarios 5a and 5b. Since the oil, coal and other fuels industry is relatively capital intensive, whereas timber, woodworking, pulp and paper, and light industry produce labor intensively, the demand for capital as well as its rental rate would increase relatively strongly if export taxes were reduced.

Geographical distribution of trade:

⁷ This applies to oil, coal and other fuels, chemicals and petrochemicals, metallurgy and machine building, glass, porcelain and faience, and to food processing (see Table 1).

WTO membership also influences the geographical distribution of trade (Table A5). As a consequence of improved market access and tax adjustments the share of non-CIS countries (MFN) in Belarus' exports would increase by 5 percentage points, rising to 50%. In turn, the share of non-CIS countries in total imports would go up from 37% to 40% if import tariffs were reduced.

6. Conclusions

The economy-wide effects of the different scenarios show that the increased price for gas imports, the trade policies and the reduced access of Belarusian goods to foreign markets as well as domestic taxation will cause significant economy-wide distortions. Based on the economy-wide results of the comparative static estimations we find that the static welfare losses from increased prices for gas imports will be about 1.5% of Belarus' consumption, while the GDP will decrease by 1.2%. However, we also find that WTO accession including tariff reductions, improved market access and adjustments of the domestic tax policies will more than compensate for the welfare losses due to the increased energy costs. If we consider higher gas prices as well as full WTO membership together the welfare gains should amount to 1.6% of Belarus' consumption and increase the GDP by 3.4%. Furthermore, the return on capital increase is expected to be around 3%. It must be noted that our assumptions concerning domestic taxation adjustments also include the reduction of export taxes by 50%. This is a crucial condition of tariff reform. However, Belarus' export taxes on oil and refinery products are tied to Russian taxes, since both countries are members of a customs union (Eurasian Economic Community) and are required to synchronize their tariff policies. Taking into consideration that Russia does not intend to decrease its export taxes on the above-mentioned group of products it is rather unlikely that Belarus will be able to reduce or drop them altogether. Yet, not reducing the export taxes would change the results significantly (comparing scenarios with and without export tax reduction). In particular, almost all the welfare and efficiency enhancing results would be poorer. WTO membership also influences the geographical distribution of trade. As a consequence of improved market access and tax adjustments, the share of non-CIS countries (MFN) in Belarus' exports would increase by 5 percentage points, rising to 50%. In turn, the share of non-CIS countries in total imports would go up from 37% to 40% if import tariffs were reduced.

WTO membership affects different industries rather differently. Nevertheless, there are some clear tendencies. The main beneficiaries seem to be oil, coal and other fuels, as well as chemicals and petrochemicals. They especially benefit from the reduced distortions from domestic taxation, by the elimination of subsidies and tax privileges that broaden the tax base and allow for reducing the average direct tax rates. They benefit even more if the domestic taxation adjustments also include export tax reductions. On the other hand, the outputs of timber, woodworking, pulp and paper, glass, porcelain and faience, and somewhat surprisingly, light industry will decline. According to our analysis, this is caused by the simultaneous reduction of ad-valorem tariffs, which protect the products of those industries on the Belarusian market, and the increase in exports of other industries such as oil, which lowers the real exchange rate and thereby also reduces export revenues.

To sum up, Russia is in the final stage of WTO accession, which presupposes that Belarus will inevitably face higher energy prices. Our study provides the evidence that despite the higher outlays for energy, WTO membership will compensate for these losses. Moreover the largest gains to Belarus will accrue from reform of the domestic tax system, including a lowering of the export taxes, which will reduce distortions (cancel subsidies and privileges). Hence implementation of the tax adjustments will be crucial for realizing gains from Belarus' WTO accession.

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Authors: Ferdinand Pavel, Irina Tochitskaya

Lector: Ricardo Giucci

Appendix A

Table A1. Impact of WTO accession on economy wide variables

	Benchmark	Higher gas prices	Higher gas prices and full WTO membership	WTO membership:			
				Reduced import tariffs	Improved market access	Tax adjustment: incl. export tax	excl. export tax
	0	1	2	3	4	5a	5b
Welfare (Equivalent Variation, change in %)	-	-1.5	1.6	0.4	1.0	1.7	0.3
GDP Index (change in %)	-	-1.2	3.4	0.3	0.8	3.3	2.2
Tariff revenue (share of public budget)	10%	10%	4%	5%	10%	9%	9%
Indirect tax revenue (share of public budget)	50%	50%	60%	55%	50%	55%	51%
Consumer Price Index (change in %)	-	0.2	3.4	0.0	0.0	2.8	2.7
Producer Price Index (change in %)	-	1.3	-0.2	-1.5	0.1	-0.4	0.1
Real exchange rate (change in %)	-	0.3	-2.8	-0.6	-0.2	-2.4	-1.2
Real factor return (change in %):							
- Return to capital (average across activities)	-	-1.3	3.0	-0.4	1.2	3.6	0.0
- Wage rate	-	-1.3	-0.6	0.8	0.7	-0.8	-0.2
Aggregate exports (BYR bn)	16694	16789	18793	17121	16911	18026	17288
Aggregate imports (BYR bn)	17611	17706	19710	18038	17827	18942	18205
Total exports (change in %)	-	0.6	12.6	2.6	1.3	8.0	3.6
Total imports (change in %)	-	0.5	11.9	2.4	1.2	7.6	3.4

Source: own estimations.

Table A2 Impact of WTO Accession on Aggregate Output by Activity

	Benchmark	Higher gas prices	Higher gas prices and full WTO membership	WTO membership:			
				Reduced import tariffs	Improved market access	Tax adjustment: incl. export tax	excl. export tax
	0	1	2	3	4	5a	5b
Output (by activity)							
Electricity and heating	1.00	0.95	0.97	1.00	1.01	1.02	1.02
Gas industry	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Oil, coal and other fuels industry	1.00	1.00	1.23	1.00	1.00	1.23	1.05
Chemicals and petrochemicals industry	1.00	0.96	1.24	0.99	1.17	1.10	1.07
Metallurgy and machine building	1.00	1.01	1.06	1.07	0.95	1.03	1.08
Timber, woodworking, pulp and paper industry	1.00	1.01	0.88	0.96	0.97	0.93	0.98
Glass, porcelain and faience industry	1.00	0.96	0.96	0.98	0.99	1.03	1.05
Light industry	1.00	1.02	0.89	0.98	0.97	0.93	0.97
Food processing	1.00	1.00	1.01	0.99	0.99	1.02	1.03
Other branches of industry	1.00	1.00	0.93	0.96	0.99	0.98	0.99
Construction	1.00	0.99	1.02	1.00	1.00	1.02	1.01
Agriculture	1.00	1.00	0.95	0.99	1.00	0.96	0.96
Forest industry	1.00	1.00	0.93	0.98	0.99	0.96	0.97
Transport	1.00	1.02	1.01	0.99	1.00	0.99	0.99
Communications	1.00	1.01	0.99	0.99	1.00	1.00	1.00
Trade, catering and interagency	1.00	1.00	1.01	0.99	1.00	1.02	1.02
Geology and hydrometeorology	1.00	0.99	1.04	1.00	1.00	1.04	1.03
Calculative and computing services	1.00	1.01	0.99	1.00	0.99	0.99	1.00
Housing and utilities, and other domestic services	1.00	0.99	0.93	1.00	1.00	0.95	0.95
Health services, culture and welfare services	1.00	1.00	0.92	1.00	0.99	0.93	0.93
Education, science and culture	1.00	1.00	0.97	1.00	1.00	0.97	0.97
Operations with real estate and financial services	1.00	1.01	0.97	0.99	1.00	0.97	0.98
Governance and defense	1.00	1.00	0.96	1.00	1.00	0.96	0.97
Public organizations	1.00	0.98	0.92	1.01	1.00	0.93	0.92

Source: own estimations.

Table A3. Impact of WTO Accession on exports

	Benchmark	Higher gas prices	Higher gas prices and full WTO membership	WTO membership:			
				Reduced import tariffs	Improved market access	Tax adjustment: incl. export tax	excl. export tax
	0	1	2	3	4	5a	5b
Exports (by activities)							
Electricity and heating	1.00	0.70	0.64	0.99	0.95	0.96	0.99
Gas industry	1.00	0.38	0.36	1.00	0.98	0.97	0.97
Oil, coal and other fuels industry	1.00	1.00	1.52	1.00	0.99	1.53	1.06
Chemicals and petrochemicals industry	1.00	0.96	1.37	1.00	1.28	1.11	1.08
Metallurgy and machine building	1.00	1.01	1.07	1.09	0.95	1.03	1.08
Timber, woodworking, pulp and paper industry	1.00	1.01	0.87	0.98	0.96	0.91	0.97
Glass, porcelain and faience industry	1.00	0.92	0.94	0.99	0.97	1.06	1.10
Light industry	1.00	1.03	0.88	1.01	0.95	0.89	0.96
Food processing	1.00	1.01	1.01	1.01	0.98	1.01	1.03
Other branches of industry	1.00	1.01	0.92	1.01	0.97	0.93	0.96
Construction	1.00	1.02	0.91	0.99	0.97	0.93	0.96
Agriculture	1.00	1.03	0.84	1.03	0.98	0.81	0.83
Transport	1.00	1.06	0.92	0.99	0.98	0.90	0.93
Communications	1.00	1.03	0.83	0.98	0.97	0.85	0.87
Trade, catering and interagency	1.00	1.03	0.72	0.99	0.98	0.71	0.76
Calculative and computing services	1.00	1.05	0.88	0.98	0.97	0.89	0.93
Housing and utilities, and other domestic services	1.00	0.98	0.94	0.96	0.97	1.00	1.03
Health services, culture and welfare services	1.00	1.02	0.74	0.97	0.96	0.78	0.80
Education, science and culture	1.00	1.04	0.71	0.96	0.96	0.74	0.77
Operations with real estate and financial services	1.00	1.04	0.77	0.96	0.97	0.80	0.81
Governance and defense	1.00	1.05	0.71	0.97	0.96	0.73	0.75

Source: own estimations.

Table A4. Impact of WTO Accession on imports

	Benchmark	Higher gas prices	Higher gas prices and full WTO membership	WTO membership:			
				Reduced import tariffs	Improved market access	Tax adjustment: incl. export tax	excl. export tax
	0	1	2	3	4	5a	5b
Imports (by commodities)							
Electricity and heating	1.00	1.28	1.53	1.03	1.08	1.09	1.06
Gas industry	1.00	1.14	1.21	1.00	1.02	1.03	1.03
Oil, coal and other fuels industry	1.00	1.00	1.22	1.00	1.01	1.22	1.01
Chemicals and petrochemicals industry	1.00	1.00	1.08	1.01	1.04	1.03	1.02
Metallurgy and machine building	1.00	1.00	1.04	1.03	0.99	1.02	1.03
Timber, woodworking, pulp and paper industry	1.00	0.99	1.09	1.03	1.01	1.05	1.04
Glass, porcelain and faience industry	1.00	1.05	1.16	1.10	1.02	0.99	0.96
Light industry	1.00	0.99	1.10	1.07	1.01	1.03	1.01
Food processing	1.00	0.98	1.10	1.02	1.02	1.07	1.03
Other branches of industry	1.00	0.99	1.21	1.15	1.02	1.04	1.02
Construction	1.00	0.97	1.14	1.01	1.04	1.12	1.07
Agriculture	1.00	0.97	1.25	1.09	1.02	1.17	1.13
Transport	1.00	0.94	1.22	1.00	1.04	1.24	1.14
Communications	1.00	0.97	1.24	0.99	1.03	1.23	1.20
Trade, catering and interagency	1.00	0.97	1.45	0.99	1.01	1.48	1.38
Calculative and computing services	1.00	0.96	1.13	1.02	1.03	1.12	1.09
Housing and utilities, and other domestic services	1.00	1.00	0.91	1.06	1.03	0.88	0.85
Health services, culture and welfare services	1.00	0.98	1.16	1.02	1.03	1.14	1.11
Education, science and culture	1.00	0.96	1.32	1.04	1.04	1.28	1.23
Operations with real estate and financial services	1.00	0.98	1.25	1.04	1.02	1.21	1.21
Governance and defense	1.00	0.96	1.32	1.03	1.04	1.29	1.25

Source: own estimations.

Table A5. Impact of WTO Accession on Geographical Distribution of Trade

	Benchmark	Higher gas prices	Higher gas prices and full WTO membership	WTO membership:			
				Reduced import tariffs	Improved market access	Tax adjustment: incl. export tax	excl. export tax
	0	1	2	3	4	5a	5b
Exports							
CIS countries (free trade area)	0.55	0.54	0.50	0.55	0.53	0.50	0.55
Other countries (MFN)	0.45	0.46	0.50	0.45	0.47	0.50	0.45
Imports							
CIS countries (free trade area)	0.63	0.63	0.60	0.58	0.63	0.64	0.63
Other countries (MFN)	0.37	0.37	0.40	0.42	0.37	0.36	0.37

Source: own estimations.

Appendix B

Table B1. Classification of Activities and Goods in the Model and in Belarus' Input-Output Tables

Model Classification	Input-Output Classification
a01 - Electricity and heating	- Electricity and heating
a03 - Gas industry	- Gas industry
a05 - Oil, coal and other fuel industry	- Oil industry
	- Coal industry
	- Other fuel industry
a08 - Chemical and petrochemical industry	- Chemical and petrochemical industry
a09 - Metallurgy and machine building	- Ferrous metallurgy
	- Non-ferrous metallurgy
	- Machine building
a10 - Timber, woodworking, pulp and paper industry	- Timber, woodworking, pulp and paper industry
a11 - Glass, porcelain and faience industry	- Glass, porcelain and faience industry
a12 - Light industry	- Light industry
a13 - Food processing	- Food processing
a14 - Other brunches of industry	- Other brunches of industry
a15 - Constructions	- Constructions
a16 - Agriculture	- Agriculture
	- Forest industry
a18 - Transport	- Transport
a19 - Communication	- Communication
a20 - Trade, catering and interagency	- Trade, catering and interagency
a23 - Geology and hydrometeorology	- Geology and hydrometeorology
a24 - Calculative and computing services	- Calculative and computing services
	- General commercial activity on providing market functioning
	- Other activities on on goods production
a26 - Housing, utilities and other domestic services	- Housing, utilities and other domestic services
a27 - Health service, culture and welfare services	- Health service, culture and welfare services
a28 - Education, science and culture	- Education
	- Culture and art
	- Science
a31 - Operations with real estate and financial services	- Operations with real estate
	- Finance, credit and insurance
	- Financial intermediation
a32 - Governance and defence	- Governance and defence
a33 - Public organizations	- Public organizations